Russian Journal of Applied Chemistry 2014 vol.87 N10, pages 1402-1411

Specific features of how macropores are formed in dehydration of gibbsite and their influence on physicomechanical properties of floccules

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Abstract

© 2014 Pleiades Publishing, Ltd. Reference contact porosimetry and scanning electron microscopy were used to study the formation of macropores in products of gibbsite dehydration in a thermal treatment of coarse floccules at 250-600°C in air. It was shown that macropores with diameters not exceeding 2000 nm and volume reaching a value of 0.032 cm3 g-1 are formed in gibbsite and its dehydration products. The macropores are formed simultaneously with mesopores and, with increasing temperature, undergo transformations by the common mechanism. The macropores are constituted by spaces between secondary particles of oxo hydroxide compounds of aluminum. The pore volume in the dehydration products becomes six times larger as the dehydration temperature is raised to 600°C. This occurs because of the denser packing of secondary particles of the oxide phase: χ-Al2O3, γ-Al2O 3 FBm, and γ-Al2O 3 Bm. The mesopores do not affect the strength characteristics of the floccules. The wear resistance of floccules in the fluidized bed is inversely proportional to the volume of macropores and decreases to 23% in the temperature range under study.

http://dx.doi.org/10.1134/S1070427214100024